

Claims:

1. A fuel cell system, comprising:
 - a) a fuel cell ;
 - b) a first reactant supply line for supplying a first reactant to the
5 fuel cell;
 - c) a second reactant supply line for supplying a second reactant to the fuel cell;
 - d) a monitoring device for monitoring a measured characteristic;
 - e) a first reactant buffer for storing an additional supply of the
10 first reactant;
 - f) a first flow regulating device for regulating an additional amount of the first reactant supplied from the first reactant buffer to the fuel cell; and
 - g) a controller for controlling the first flow regulating device in
15 response to the measured characteristic.
2. A fuel cell system as claimed in claim 1, wherein the measured characteristic includes at least one of a first reactant pressure in the first reactant supply line and a current the load draws from the fuel cell.
3. A fuel cell system as claimed in claim 2, wherein the controller is
20 operable to control the first flow regulating device to increase the amount of the first reactant supplied from the first reactant buffer in response to a change in the measured characteristic indicative of at least one of an increase in the current drawn from the fuel cell and a decrease in the first reactant pressure in the first reactant supply line.
- 25 4. A fuel cell system as claimed in claim 3, wherein the first reactant supply line is operable to supply the first reactant at a first reactant pressure, and the first reactant buffer is operable to store the first reactant at a substantially higher pressure than the first reactant pressure in the first reactant supply line.

5. A fuel cell system as claimed in claim 4, further comprising a first reactant primary supply device disposed in the first reactant supply line for supplying the first reactant to the fuel cell and a first reactant secondary supply device for supplying the first reactant to the first reactant buffer.

5 6. A fuel cell system as claimed in claim 5, wherein the first reactant secondary supply device, the first reactant buffer and the first flow regulating device are disposed in a bypass line that bypasses the first reactant primary supply device.

7. A fuel cell system as claimed in claim 6, further comprising a
10 first pressure sensor disposed in the first reactant supply line immediately upstream of the fuel cell for measuring the first reactant pressure in the first reactant supply line and supplying a first signal representing the first reactant pressure to the controller.

8. A fuel cell system as claimed in claim 7, further comprising a
15 current sensing device for sensing the current drawn from the fuel cell and supplying a second signal representing the current to the controller.

9. A fuel cell system as claimed in claim 8, further comprising a second pressure sensor for sensing a first reactant buffer pressure inside the first reactant buffer and supplying a third signal representing the first reactant
20 buffer pressure to the controller.

10. A fuel cell system as claimed in claim 9, wherein the controller is operable to

control the first reactant secondary supply device to stop supplying the first reactant to the first reactant buffer when the first reactant
25 buffer pressure increases to a first predetermined level; and

actuate the first reactant secondary supply device to supply first reactant to the first reactant buffer when the first reactant buffer pressure falls to a second predetermined level lower than the first predetermined level.

11. A fuel cell system as claimed in claim 10, wherein the first reactant is an oxidant.
12. A fuel cell system as claimed in claim 1, further comprising
a second reactant buffer for storing an additional quantity of the
5 second reactant;
a second flow regulating device for regulating an additional amount of the second reactant supplied from the second reactant buffer to the fuel cell; wherein the controller is operable to control the second flow regulating device in response to the measured characteristic..
- 10 13. A method of operating a fuel cell system, comprising:
a) supplying a first reactant to a fuel cell;
b) supplying a second reactant to the fuel cell;
c) supplying and storing an additional supply of the first
reactant in a first reactant buffer;
15 d) measuring a measured characteristic; and
e) adjusting an additional amount of first reactant supplied to the fuel cell from the first reactant buffer in response to the measured characteristic.
14. A method of operating a fuel cell system as claimed in claim 13,
20 wherein the measured characteristic includes at least one of a first reactant pressure in the first reactant supply line, and a current drawn from the fuel cell.
15. A method of operating a fuel cell system as claimed in claim 14,
wherein step (e) comprises increasing the additional amount of the first
25 reactant supplied from the first reactant buffer in response to at least one of a change in the measured characteristic indicative of at least one of an increase in the current drawn from the fuel cell and a decrease in the first reactant pressure in the first reactant supply line.

16. A method of operating a fuel cell system as claimed in claim 13, wherein step (c) comprises storing the first reactant at a higher pressure in the first reactant buffer than the first reactant pressure.

17. A method of operating a fuel cell system as claimed in claim 16,
5 further comprising:

f) measuring a first reactant buffer pressure inside the first reactant buffer; and

g) supplying the first reactant to the first reactant buffer when the first reactant buffer pressure falls to a second predetermined level; and,

10 h) stopping supply of the first reactant to the first reactant buffer when the first reactant buffer pressure increases to a first predetermined level higher than the second predetermined level.

18. A method of operating a fuel cell system as claimed in claim 13 wherein the first reactant is an oxidant.